

# Modern Concepts of Cardiovascular Disease

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## PROGNOSIS IN OCCLUSION OF THE CORONARY ARTERIES

**INTRODUCTION.** In occlusion of the coronary arteries practically every symptom and sign and every factor contributing to the incidence is a valuable aid in prognosis.

The mortality rate has usually been cited as about 50 per cent but the variation is wide; even of late years extremes ranging from 60 to 70 per cent (Hochrein) to 10 per cent (Mullin) have been cited. Recent experience, however, indicates that the probable rate lies between 20 and 30 per cent in ward cases and 15 and 25 per cent in private cases.

**MORTALITY RATE.** The general mortality rate in the series of 267 cases of coronary artery thrombosis recently reported by Master, Jaffe and Dack was 16.5 per cent, 20 per cent in ward cases and 12 per cent in private cases. The rate following initial attacks was 10 per cent in ward and 5.5 per cent in private cases. These figures include all the deaths that occurred in the series from the time of admission to the hospital until discharge or in private practice, from the time the patients were first seen until they were able to leave the house. If a patient survives the first twenty-four hours, the prognosis is definitely better.

**FACTOR OF NUMBER OF ATTACKS.** Conner and Holt have emphasized the fact that the prognosis is much better in initial than in later attacks of occlusion and that an attempt should always be made to ascertain the number of the attack from which the patient has suffered. In the series of cases reported by Master, Jaffe and Dack, the prognosis became poorer with each succeeding attack; the mortality rate in the first was 11 per cent, in the second 22 per cent, and in the third 50 per cent. It will be found that previous attacks have occurred in about half of the cases encountered and it is important to remember this in evaluating the published statistics in coronary thrombosis.

**AGE.** An increasing number of cases of coronary thrombosis is found in individuals under 50 and even under 40 years of age. Conner and Holt have brought out this point and in our series almost 35 per cent of the cases occurred in patients under 50 years of age.

The prognosis for the attack is best in the younger and poorest in the older age groups. Thus we found that in 21 attacks in individuals 40 years of age or younger, only 2 died; in 62 attacks in patients between 40 and 50, 8 died. The mortality rate rose steadily in the older patients reaching 22 per cent in the eighth decade. Although the outlook in an attack of coronary thrombosis is much better in the young it must not be forgotten that the life span of a man who sustains a coronary occlusion at the age of 30 will probably be much shorter than that of the man who first meets with this accident at the age of 50 or 70 years.

**SEX.** We have found that the proportion of men to women suffering from coronary thrombosis is 3 or 4 to 1 rather than 5 or 10 to 1 as reported by many observers. Levine's figures coincide with ours and Moritz and Beck in postmortem examination found a 3 to 1 ratio. As diagnostic acumen improves it will be learned that coronary thrombosis is not uncommon in women. The classical picture of a coronary attack is a little less apt to appear in women than in men; severe pain is not so frequent and pulmonary edema may exist with no pain or only minimal pain. The mortality rate is about the same for both men and women in spite of the fact that this disease, when found in women, is usually associated with diabetes or hypertension.

**IMPORTANCE OF EARLY DIAGNOSIS.** Early correct treatment is essential for recovery from an attack and, therefore, the differential diagnosis is an important factor in the prognosis. For instance, if an occlusion of the coronary arteries is considered to be a severe attack of angina pectoris due to coronary artery disease the patient will be permitted to go about his regular routine when he should be in bed. Until the diagnosis is certain, the patient should be put to bed and complete rest enjoined.

**INFLUENCE OF HEART FAILURE.** Congestive heart failure was present in nearly two-thirds of our ward cases. By this term is meant insufficiency of either the left or right ventricle alone or of both ventricles combined. We have never found a case of right heart failure alone although it is conceivable that this might occur with a lesion involving only the right ventricle, especially if the patient had been subjected to previous right ventricular strain from long-standing emphysema or pulmonary fibrosis. In spite of the fact that coronary thrombosis is cited as the classical example of left ventricular strain, the majority of cases of heart failure are combined left and right ventricular failure. When left ventricular failure alone occurs the mortality rate is much lower (4 per cent) than in the cases with failure of both ventricles (40 per cent). Almost all the fatal cases show combined right and left heart failure.

The best instrumental measure of heart failure and incidentally of prognosis is the vital capacity. It is also extremely useful in following the patient's daily course. A vital capacity less than 50 per cent of normal is ominous.

**PAIN.** The severity of the pain is of no great significance except indirectly; that is, if it is minimal the patient may not appreciate the seriousness of his condition and go about his work until another attack supervenes. Patients treated properly with complete rest in bed and small meals are usually free of pain in two or three days. When severe pain lasts for days and weeks the prognosis is not as good. How-

ever, pain may not be present even in severe attacks. This occurs in hyposensitive patients.

**SHOCK.** Shock occurs in half the cases seen in the hospital and the mortality rate is almost six times as great as in patients who show no evidence of shock. Both peripheral vascular collapse (shock) and heart failure occur very frequently in the same patient and at the same time. For example, in 80 per cent of the cases with shock, heart failure was present. However, early in the attack shock usually predominates.

**DYSPNEA.** Dyspnea is one of the earliest, most reliable and most obvious signs of heart failure. The presence of dyspnea and orthopnea is serious. So, too, is a respiratory rate of more than 28 per minute and the longer the duration of this tachypnea, the worse the outlook. These signs are associated chiefly with pulmonary congestion and a diminished vital capacity.

**PULMONARY EDEMA.** Pulmonary edema may be the first and in fact the main indication of a myocardial infarction, as Libman and Levine have pointed out. When present it is usually found with hypertension and an enlarged heart. The mortality rate of our patients with pulmonary edema was 50 per cent.

**CYANOSIS.** Cyanosis may develop in very ill patients and is accompanied by a mortality rate of about 30 per cent. Its presence, particularly in the less severe forms, may be difficult to determine as patients with coronary thrombosis customarily have a skin ashy-gray in color. The cyanosis, therefore, may produce an ashy-gray hue or the ordinary definite blue but rarely the purplish acrocyanosis associated with marked slowing of the circulation.

**PULSE RATE.** A pulse rate over 100 at any stage of the disease, even during shock when an increased heart rate is to be expected, contributes to a poor prognosis. Naturally, the longer the tachycardia persists the gloomier the outlook. Tachycardia is not characteristic of coronary thrombosis except in severe heart failure. A slow heart rate, particularly a rate of not more than 80 beats per minute provided a regular sinus rhythm is present, is a very good prognostic sign. Of course, a slow pulse due to a complete heart block is an entirely different matter; this is indeed a serious condition.

**HYPERTENSION.** It is interesting to note that the severity of a lesion is not increased by previous hypertension. In a considerable number of our cases the outcome for the immediate attack was as favorable in patients with as without hypertension. In fact, from the point of view of prognosis, blood pressure is of importance only when the pulse pressure is considered and even then it is significant only when 20 mm. Hg. or less. In the latter case, the mortality rate was nearly 60 per cent, undoubtedly because this low pulse pressure is found in the patients with severe shock and congestive heart failure.

**HEART SOUNDS.** A diminished intensity of the heart sounds is characteristic of coronary thrombosis and their quality when definitely impaired or when a gallop rhythm exists, is a serious sign. A tic-tac quality or an embryocardia are significant and a gallop rhythm is observed in patients with large hearts and congestive failure.

We have found the presence or absence of a pericardial rub of little importance. The development of a loud rough systolic murmur over the entire precordium, particularly over the sternum may indicate a perforation of the interventricular septum, probably invariably fatal.

**ARRHYTHMIAS.** Arrhythmias develop frequently during occlusion of the coronary arteries but are

usually transitory and require no treatment. Even auricular fibrillation, auricular flutter, paroxysmal tachycardia, partial heart block with dropped beats etc., do not indicate increased severity of the disease. Complete heart block may be an exception although Schwarz has cited patients with acute coronary thrombosis in whom complete heart block with Stokes-Adams' syndrome was not fatal. Some authors, particularly Levine, have advised quinidine sulphate for persistent ventricular tachycardia but my experience thus far in this specific arrhythmia has been too limited to pass judgment. In the few cases that I have seen even this arrhythmia was usually transitory.

**CARDIAC ENLARGEMENT.** Enlargement of the heart is one of the findings most constantly associated with heart failure and therefore, of course, it adds to the seriousness of the outlook. It is the rule to find enlarged hearts in postmortem examination of cases of coronary thrombosis. Conversely, a patient suffering from coronary occlusion who has a normal sized heart has a very good chance for recovery.

**LEUCOCYTOSIS.** A leucocyte count of more than 15,000 is significant of a severe lesion. Goodrich and Smith in a recent publication have pointed out the importance of the filament count.

**FEVER.** Temperature higher than 101°F. and continuing for more than a week may indicate an attack of more than average severity. It is usually symptomatic of a marked area of myomalacia or of some complication of pulmonary origin. It has been found in the presence of a large mural thrombus.

**LOCATION OF INFARCT.** The frequency and the prognostic value of anterior and posterior infarction has been discussed by many writers. In the opinion of recent investigators the frequency and mortality rate is the same in each type of lesion. When both anterior and posterior surfaces are damaged the prognosis is unfavorable. Electrocardiographically, involvement of both surfaces is characterized by abnormalities of the Q and T-waves in all three leads. In a large percentage of the fatal cases of coronary thrombosis, postmortem examination reveals involvement of both anterior and posterior surfaces of the left ventricle and two-thirds show occlusion of the left and right coronary arteries.

**COMPLICATIONS.** The most common complications are pulmonary lesions, such as pneumonia, pulmonary infarctions and cerebral accidents. The frequency of emboli due to mural thrombi is not appreciated. Mural thrombi have been found in more than half the cases examined at autopsy by Applebaum and Nicholson. Complications of this type render the outlook worse but not necessarily fatal. We have seen very sick patients including one with an amputation recover from femoral or popliteal embolization.

**CAUSE OF IMPROVEMENT IN PROGNOSIS.** Prognosis in coronary thrombosis has definitely improved, a fact pointed out by Conner and Holt-Cooksey; Master, Jaffe and Dack and Mullins. The factor chiefly responsible for this improvement is better diagnostic acumen. Physicians realizing the immediate and correct treatment saves lives and alert to recognize an occlusion of the coronary arteries and the electrocardiograph is of immeasurable value in diagnosing doubtful cases. That the outlook in private cases is better than in ward cases of a hospital is due primarily to the fact that the private patient comes under the care of his physician at a much earlier stage of the disease.

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